

## **2.3 Methodology for Determining Species of Greatest Conservation Need**

Several of the interactive planning teams mentioned in the first section of this chapter worked collectively to develop a process to identify Species of Greatest Conservation Need for Wisconsin. This analysis included all **native** wildlife species in Wisconsin. Wildlife species considered included birds, mammals, herptiles, fish, and invertebrates including mussels, butterflies, moths, etc.

The approach used to identify Species of Greatest Conservation Need focused on:

- Using existing data;
- Including taxa for which good data currently exist and documenting the rationale used to select the taxa/species;
- Simple approaches that could be easily explained to non-technical audiences, readily replicated for plan updates over time, and could be completed within the established deadline;
- Methods that were objective and scientifically defensible;
- Encouraging simple and efficient peer review;
- Allowing consideration of habitat at a broad scale in order to provide benefits to multiple species;
- Considering multiple categories of Species of Greatest Conservation Need.

Various methods were suggested to identify Wisconsin's Species of Greatest Conservation Need.

Examples of problems recognized early in the process when using/testing several alternative methods include:

- Identifying species found in vulnerable or declining habitats (e.g., wetlands, etc.) does not filter out enough species and also includes species that are not rare or declining that can be found in those habitats;
- Unique life history considerations are often subjective;
- Area of Importance should not be used to exclude species that could be considered Species of Greatest Conservation Need because this may eliminate edge-of-range species;
- Using Global Abundance, Global Distribution, Global Threats, State Threats, Global Population Trend, State Population Trend, and Area of Importance as the seven criteria used to rank species biases against state criteria in favor of global criteria;
- Rather than using State Rank (measure of rarity based on number of occurrences in Wisconsin), rounded State Rank should be used for the determination of State Rarity values because rounded State Rank is more conservative;
- Presenting Species of Greatest Conservation need in "tiers" conveys a sense that one tier of species is more important than another tier. Tiers were not used in order to eliminate any perception that one category of Species of Greatest Conservation Need should be viewed as more important than another.

Two separate approaches were developed in order to meet the federal requirements as they relate to the development of Wisconsin's Comprehensive Wildlife Conservation Plan. Vertebrate Species (birds, fish, herptiles, and mammals) of Greatest Conservation Need were identified using the approach that is explained in detail in Section 2.3.1. Invertebrate Species of Greatest Conservation Need were determined through a separate process detailed in Section 2.3.2. A list of the species that appear in this document, but were not evaluated for their potential to be invertebrate or vertebrate Species of Greatest Conservation Need appears in Appendix A. These species were not evaluated because they do not meet the process criteria explained in the following sections (i.e., exotics) or they are not wildlife species (i.e., plants).

## **2.3.1 Methodology for Determining Vertebrate Species of Greatest Conservation Need**

### **2.3.1.1 General Introduction**

Wisconsin's list of vertebrate Species of Greatest Conservation Need was finalized after more than a year of analysis, discussion, and evaluation by teams of species experts and others. The agreed upon approach that led to the list of Wisconsin's vertebrate Species of Greatest Conservation Need is presented below. This process used the best available data and considered the most relevant ecological factors in assessing need for conservation of each species.

### **2.3.1.2 Method Used to Identify Vertebrate Species of Greatest Conservation Need in Wisconsin**

The vertebrate species that were considered during this process came from a master list including all vertebrate species known to occur in Wisconsin (Bleser 2002), which was cross-referenced with other Wisconsin vertebrate species lists (Wisconsin Natural Heritage Program 2004a, Watermolen and Murrell 2001). Exotic species (e.g., ring-necked pheasant), extinct species (e.g., blackfin cisco), and those species that are considered extralimital or accidental (e.g., northern mockingbird) were removed from consideration. These species did not make it past the first "filter" because they did not meet the requirements set forth by the Comprehensive Wildlife Conservation Plan Advisory Team which established that exotic and extinct species as well as extralimital or accidental species should not be identified as Species of Greatest Conservation Need. A couple of edge-of-range species (e.g., Kirtland's warbler) were kept on the list to be considered because they are so rare throughout their entire range.

The vertebrate Species Teams evaluated each native vertebrate species upon seven criteria that helped define the risk and conservation need of each native species. The criteria considered were: state rarity, state threats, state population trend, global abundance, global distribution, global threats, and global population trend. These criteria are ecological factors that affect the dynamics of populations. Each criterion provided a measure of a species' vulnerability and was scored on a scale of 1 to 5. A description of the species assessment scores and their associated descriptions are provided following the explanation of how this information was used.

Vertebrate Species Teams comprised of the species experts identified in Section 2.1 utilized literature sources, databases, communication with colleges, and personal knowledge to assign scores to each of the assessment criteria. For example, species experts consulted the Natural Heritage Inventory Database (BIOTICS), Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004), U.S. Shorebird Conservation Plan (Brown et al. 2001), Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan (Kushlan et al. 2002), Wisconsin Fishes 2000: Status and Distribution (Lyons et al. 2000), Geographic distributions of the amphibians and reptiles of Wisconsin (Casper 1996), Mammals of Wisconsin (Jackson 1961), and Mammals of the Great Lakes Region (Kurta 1995). Additional literature sources consulted during the planning process are provided in the Bibliography of this document.

Quantitative data were used to assign scores whenever possible. However, there are many species for which data are lacking or little or no knowledge exists. For those species, qualitative information based on best professional judgment was used. Species assessment scores for all native vertebrate species considered will be made available in CD format. These data may be obtained by contacting the Bureau of Endangered Resources at (608) 266-7012.

The mean of the species assessment scores, referred to in this document as "Mean Risk Score," was used to identify the vertebrate Species of Greatest Conservation Need. The Mean Risk Score of each species was obtained by summing the vertebrate species assessment scores of each species and dividing the

summed value by the number of criteria scored. Note that for a small number of vertebrate species, all seven criteria could not be scored due to a lack of population data. Vertebrate species were sorted by their Mean Risk Score from high to low within each vertebrate taxa group.

A cut-off was established for each vertebrate taxa group by the respective vertebrate Species Team in order to identify those vertebrate species that should be considered vertebrate Species of Greatest Conservation Need based on the distribution of Mean Risk Scores. Each cut-off was assigned using a “natural breakpoint” in the data. The cut-off assigned to each of the vertebrate species taxa groups is as follows: Birds = 3.14, Fish = 3.42, Herptiles = 3.29, and Mammals = 3.00. Vertebrate species possessing a Mean Risk Score at or above the cut-off were considered vertebrate Species of Greatest Conservation Need. Those that fell below the cut-off were not. In addition, all federal and state listed vertebrate species whose presence in Wisconsin is not considered accidental were automatically added to the list of vertebrate Species of Greatest Conservation Need whether they fell above or below the cut-off.

The seven species assessment criteria used to determine Mean Risk Scores are as follows:

#### State Rarity

State Rarity is a measure of the relative abundance of breeding individuals of a species within the state relative to the abundance of breeding individuals of other species. This process assumes that species that are rare or uncommon in the state are more vulnerable to decline or extinction from the state than species that are more common. State Rarity was quantified using a parameter developed from State Ranks, which are a measure of species' rarity based on their number of occurrences in Wisconsin (Wisconsin Natural Heritage Program 2004b).

State Rarity Score	Definition
1	Demonstrably secure in Wisconsin
2	Apparently secure in Wisconsin, with many occurrences
3	Rare or uncommon in Wisconsin (21-100 occurrences)
4	Imperiled in Wisconsin because of extreme rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making the species very vulnerable to extirpation from the state
5	Critically imperiled in Wisconsin because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factors(s) making the species especially vulnerable to extirpation from the state

#### State Threats

This factor reflects the effects of current and future extrinsic conditions on the ability of a species to maintain healthy populations through successful reproduction in the state. Threats to suitable breeding conditions are defined as any extrinsic factor that reduces the likelihood of the persistence of a population and can include predation, poaching, parasitism, poisoning from pesticides or other environmental contaminants, habitat fragmentation, deterioration, or loss, hybridization, collisions with power lines or other hazards, and other extrinsic factors that reduce the suitability of breeding conditions.

State Threats Score	Definition
1	Future conditions for breeding populations are expected to be enhanced by human activities or land-uses; potentially a "problem" species
2	Future conditions for breeding populations are expected to remain stable; no known threats
3	Slight to moderate decline in the future suitability of breeding conditions is expected
4	Severe deterioration in the future suitability of breeding conditions is expected
5	Extreme deterioration in the future suitability of breeding conditions is expected; species is in danger of regional extirpation or major range contraction, or has a low probability of successful reintroduction where already extirpated

### State Population Trend

State Population Trend is an indicator of vulnerability and represents the direction and magnitude of changes in the state population size over the past 30 years. This process assumes that state population decreases are an indication of species' vulnerability in Wisconsin.

State Population Trend Score	Definition
1	Large population increase over the past 30 years
2	Possible or moderate population increase, or population stable over the past 30 years
3	Uncertain population trend over the past 30 years
4	Possible or moderate population decrease over the past 30 years
5	Large population decrease over the past 30 years

### Global Relative Abundance

This is a measure of the global relative abundance of breeding individuals of a species within its range relative to other species. Interpretation of this score is based on the assumption that species that are rare or uncommon are more vulnerable to decline or extinction than species that are more common.

Global Relative Abundance Score	Definition
1	Occurs in highest relative abundance
2	Occurs in high relative abundance
3	Occurs in moderate relative abundance
4	Occurs in low relative abundance
5	Occurs in lowest relative abundance

### Global Distribution

This factor represents global distribution of breeding individuals of a species during the breeding season. Interpretation of this score is based on the assumption that species with a narrowly distributed breeding population are more vulnerable than species with a widely distributed breeding population.

Global Distribution Score	Definition
1	Distribution area occupied is most of the continent
2	Distribution area occupied is $\frac{3}{4}$ of continent
3	Distribution area occupied is half the continent
4	Distribution area occupied is $\frac{1}{4}$ of the continent
5	Distribution area occupied is very restricted, covering only a small part of the continent

### Global Threats

This factor reflects the effects of current and future extrinsic conditions on the ability of a species to maintain healthy populations through successful reproduction. Threats to suitable breeding conditions are defined as any extrinsic factor that reduces the likelihood of the persistence of a population, and can include predation, poaching, parasitism, poisoning from pesticides or other environmental contaminants, habitat fragmentation, deterioration, or loss, hybridization, collisions with power lines or other hazards, and other extrinsic factors that reduce the suitability of breeding conditions.

Global Threats Score	Definition
1	Future conditions for breeding populations are expected to be enhanced by human activities or land-uses; potentially a "problem" species
2	Future conditions for breeding populations are expected to remain stable; no known threats
3	Slight to moderate decline in the future suitability of breeding conditions is expected
4	Severe deterioration in the future suitability of breeding conditions is expected
5	Extreme deterioration in the future suitability of breeding conditions is expected; species is in danger of regional extirpation or major range contraction, or has a low probability of successful reintroduction where already extirpated

### Global Population Trend

This factor reflects the direction and magnitude of changes in the global population size over the past 30 years. This process assumes that global population decreases are an indication of species' vulnerability.

Global Population Trend Score	Definition
1	Large population increase over the past 30 years
2	Possible or moderate population increase, or population stable over the past 30 years
3	Uncertain population trend over the past 30 years
4	Possible or moderate population decrease over the past 30 years
5	Large population decrease over the past 30 years

Vertebrate Species Team members reviewed the resulting list of Species of Greatest Conservation Need. Species Team members were given guidance that they could use their best professional judgment to add or remove species from the list on a case-by-case basis, if warranted. Minor adjustments to the list of

vertebrate Species of Greatest Conservation Need were made by the species experts to correct for species they perceived not to be characterized accurately. All changes were documented and are provided below.

The Mammal Species Team experts opted to remove least shrew, Indiana bat, wolverine, eastern spotted skunk, Canada lynx, mountain lion (cougar), woodland caribou, and bison from the list of vertebrate Species of Greatest Conservation Need. They believed these species would be more accurately represented on the information needed list, which is described in Section 2.3.1.4. These eight species were all identified as exhibiting an uncertain State Population Trend.

Bird species were both added and removed from the list of vertebrate Species of Greatest Conservation Need by the Bird Species Team. Seven of the ten bird species (northern harrier, red crossbill, blue-winged teal, wood thrush, blue-winged warbler, black-throated blue warbler, and northern goshawk) were added for a variety of reasons, while three bird species (least flycatcher, veery, and brown thrasher) were added for the same reason (see Table 2-19).

**Table 2-19. Justification for Addition of Individual Bird Species to the List of Vertebrate Species of Greatest Conservation Need.**

Species Name	Justification
Northern harrier	Area sensitive grassland/wetland bird that is widely distributed throughout the state, but is declining in many grassland areas south of the Tension Zone.
Red crossbill	New research suggests nine different species. Regional experts suggest a decline based on lack of mature upland conifers. If the scores would have been for each distinct species, it is likely that one or more of the species would have made the list due to restricted ranges and low State Rank (high State Rarity) scores.
Blue-winged teal	Neotropical migrant grassland nesting waterfowl. Requires juxtaposition of both upland grasslands for nesting cover and wetland complexes for brood rearing. Declining throughout eastern part of its range.
Wood thrush	Partners in Flight Continental Watch List species
Blue-winged warbler	Partners in Flight Continental Watch List Species
Black-throated blue warbler	Area sensitive, interior gap specialist, may be sensitive to high white-tailed deer populations and needs large blocks of older forest.
Northern goshawk	Area sensitive, occupies older forests, due to listing concerns in other portions of its range there is a need for a WI status assessment both for managers and conservationists.
Least flycatcher, veery and brown thrasher	Highest relative abundance in Wisconsin compared to their overall range. These species are declining both globally and in the state, but were not included in the original list of vertebrate Species of Greatest Conservation Need because they are not state or federally listed and other criteria contributing to their mean species assessment score were not high enough to generate a mean species assessment score above the cut line.

The Bird Species Team decided to remove the prairie warbler, black rail, red knot, and bay-breasted warbler from the list of vertebrate Species of Greatest Conservation Need. Justification for removal of these species is provided in Table 2-20.

**Table 2-20. Justification for Removal of Individual Bird Species from the list of Vertebrate Species of Greatest Conservation Need.**

Species Name	Justification
Prairie warbler	Breeding males do not occur in Wisconsin on a consistent basis.
Bay-breasted warbler	Common migrant, no confirmed breeding records in the Breeding Bird Atlas. If it is determined that Wisconsin is limiting during migration, successive iterations of this plan can be revised accordingly.
Black rail	Breeding males do not occur in Wisconsin on a consistent basis.
Red knot	Wisconsin is too far on the edge of its range for any serious conservation action to take place

The Herptile Species Team decided to add four species to the list of vertebrate Species of Greatest Conservation Need: northern prairie skink, mudpuppy, ring-neck snake, and boreal chorus frog. Justification for addition of these species is provided in Table 2-21.

**Table 2-21. Justification for Addition of Individual Herptile Species to the List of Vertebrate Species of Greatest Conservation Need.**

Species Name	Justification
Northern prairie skink	This species is colonial, which makes it vulnerable to localized disturbance and natural succession. Its habitat has been reduced by pine plantings and development and almost no scientific data exist on its status.
Mudpuppy	The status of the mudpuppy has been compromised by instream habitat degradation and the use of lampricides in many tributaries to the Great Lakes. Lampricide impacts have been documented in Ohio and should apply in Wisconsin. Needed baseline data do not exist for this species. This species may also have been affected by the biological supply trade that existed in an unregulated fashion until 2000. One supplier in Wisconsin is purchasing over 11,000 mudpuppies annually from Minnesota, so there is still a market for them, and they can be legally commercialized here under a license, but without limits.
Ring-neck snake	This species is colonial and vulnerable to localized disturbances and natural succession. It has already experienced habitat loss due to these two factors and therefore its status may mimic what has happened to the other prairie-dependent snakes in Wisconsin, all of which are included above the cut line. No baseline data exist for the species. It is listed as special concern in Wisconsin.
Boreal chorus Frog	There are very few data on the population status and extant range in Wisconsin. Historically the species had a very limited range in northwestern Wisconsin, but surveys to date (frog and toad survey exclusively) do not differentiate this species from the western chorus frog. The boreal chorus frog has recently been recognized as a distinct species and warrants Species of Greatest Conservation Need status.

A total of 556 vertebrate species were evaluated for consideration as vertebrate Species of Greatest Conservation Need. The final list of vertebrate Species of Greatest Conservation Need includes 152 species: 84 birds, 30 fish, 24 herptiles, and 14 mammals. Lists of these species, by taxa, are presented in Chapter 3 as well as in Appendix B. The number of vertebrate Species of Greatest Conservation Need selected equates to approximately 27% of the native vertebrate species that were considered during this process.

### 2.3.1.3 Selected Method for Categorizing Vertebrate Species of Greatest Conservation Need in Wisconsin

Area of Importance was used to divide vertebrate Species of Greatest Conservation Need into categories. **These categories were not created in order to prioritize vertebrate species, but rather as another level of analysis for individuals who will be implementing this plan.** Area of Importance reflects the

relative importance of the state to a species and its conservation, based on the abundance of the species in the state relative to other areas within its range.

Area of Importance Score	Definition
1	Does not occur in manageable numbers; could include species of accidental or sporadic occurrence
2	Present in low relative abundance, but occurs in manageable numbers in at least part of the state
3	Present in moderate relative abundance, relative to other parts of a species' range
4	Present in high relative abundance, relative to other parts of a species' range
5	Present in highest relative abundance within a species' range

The reasoning behind the Area of Importance concept is that conservation measures for species are likely to be most effective if enacted in core areas of the species' population rather than on the periphery. However, it is not a measure of ecological importance of conservation measures.

Vertebrate Species of Greatest Conservation Need were divided into three categories. Vertebrate Species of Greatest Conservation Need with an Area of Importance score of 4 or 5 were considered to be species that have high relative abundance in Wisconsin compared to the rest of their range. Vertebrate Species of Greatest Conservation Need with an Area of Importance score of 2 or 3 were determined to have moderate to low abundance in Wisconsin compared to the rest of their range. Vertebrate Species of Greatest Conservation Need with an Area of Importance Score of 1 were those species believed to occur in very low numbers in Wisconsin compared to the rest of their range.

#### **2.3.1.4 Vertebrate Species Not Identified as Vertebrate Species of Greatest Conservation Need in Wisconsin**

Two additional groups of vertebrate species were also identified for which research/conservation attention may be needed. These species are not considered vertebrate Species of Greatest Conservation Need because they did not meet the established criteria, and therefore they are not addressed further in this plan. Neither list is mutually exclusive, meaning that one or multiple species could appear on either of these lists. The first of these groups identifies vertebrate species for which additional information (inventory and monitoring) is needed. These species are presented in Appendix B. These species are not on the vertebrate Species of Greatest Conservation Need list, but they do have an uncertain Global or State Population Trend. More information is needed to assess the status of these species. The Bird, Fish, and Mammal Species Teams used an objective selection criteria to determine the species that would be identified in this group. They selected all species that were assigned a Global or State Population Trend of 3. In addition, several species were removed from the list of Species of Greatest Conservation Need and placed in this group based on best professional judgment of the Species Team members. An explanation of the basis for this decision and the species to which it applies appear in the preceding section.

The Herptile Species Team took a more subjective look at those species for which additional information is needed. They chose to specifically identify the species not considered vertebrate Species of Greatest Conservation Need for which additional inventory and monitoring is needed (Table 2-22). They believed this approach would result in more focused inventory and monitoring efforts where there is a justifiable need for more data.



**Table 2-22. Herptile Species for which Additional Inventory and Monitoring is Needed.**

Species Name	Justification
Northern ringneck snake	Very few data exist for this state special concern species. Detection methods have yet to be developed and warrant testing to help scientists better determine its range, habitat parameters, and population health.
False map turtle	Questions exist about the status of this species, as it is primarily restricted to the Mississippi River. It is a species of special concern in Wisconsin and may have been out-competed by the Ouachita map turtle in several pools in the Mississippi River and in the lower Wisconsin River, where it appears to be extremely rare.
Plains gartersnake	This species has recently become a concern to state herptile experts, as it appears to have disappeared from a number of localities from which voucher specimens were previously collected. No efforts have ever been undertaken to provide even a crude baseline for this species. It is currently intergrading with the state threatened Butler's gartersnake ( <i>Thamnophis butleri</i> ) in southeastern Wisconsin and may have been out-competed by the common gartersnake ( <i>Thamnophis sirtalis</i> ) through much of southern Wisconsin.
Spotted salamander	Very limited data exist for this species. Monitoring is warranted to determine the long-term impacts of silviculture. This species prefers older mature hardwood or hardwood/conifer forests where cooler microhabitats and high humidity prevails. It is hypothesized that this species has declined in density because the quality of its habitat has been compromised.
Painted turtle	Populations of this species have declined, but population status is still unclear. Monitoring to evaluate nesting success is warranted, as this appears to be one of the factors influencing populations. This is one species that could possibly be monitored using a basking turtle survey.
Five-lined skink	This prairie, savanna, and barrens species has never been inventoried in Wisconsin. Inventory of this species is warranted because of habitat loss caused by several factors including succession, development, and forestry (e.g., planting sand prairie to pine plantations).
Snapping turtle	This species has been impacted in several areas of the state by commercial trapping and may also be experiencing declines statewide related to low nesting success (heavy nest predation). It would be useful to establish baseline population levels for several representative waterbodies that would be monitored over time to look at trends. This information could guide future management of the species, including harvest regulations.
Common musk turtle	Few data exist on the population status of this turtle, although it is known to occupy numerous lakes that have experienced significant development, particularly in southeastern Wisconsin. This species may be declining because of low nesting success.
Bullfrog	The bullfrog is a state special concern species that is not statistically well represented in the annual frog and toad survey, in part due to its scattered distribution. Its status is currently unclear, but its harvest has been regulated in one Wisconsin county that experienced heavy commercialization by the biological supply industry. This species is still subject to limited harvest for frog legs.

The Herptile Species Team's reasons for not selecting all of the herptile species with a Global or State Population Trend of 3 are as follows:

1. The annual Frog and Toad Survey provides sufficient data on the status of the frogs and toads. Additional efforts are unwarranted for species for which an inventory or monitoring need has not been identified. The Herptile Species Team recommended that this survey be maintained into the foreseeable future.

2. The status of most of the other herptile species for which additional inventory and monitoring activities could be undertaken are clearly secure due to known range and abundance information despite a lack of baseline data to evaluate trends.
3. There are a few herptile species (e.g., central newt and northern water snake) for which it is hypothesized that declines have occurred, but additional information is not warranted at this time as these species are still known to be relatively abundant.

The second group of vertebrate species for which research/conservation attention may be directed are those species that are not currently considered to be at risk but for which Wisconsin is important to their future existence because it contains a large part of the population or continental range of these species. These are species that were assigned an Area of Importance value of 5; they are listed in Appendix B. Although these are not vertebrate Species of Greatest Conservation Need and their populations may not be at immediate risk, it is important for Wisconsin to consider these “responsibility” species in any management plan.

A final vertebrate species list (Appendix B) contains a collection of those vertebrate species that did not meet any of the selection criteria for the three previously mentioned lists: 1) vertebrate Species of Greatest Conservation Need, 2) vertebrate species not identified as Species of Greatest Conservation Need for which additional information is needed, and 3) vertebrate species not identified as Species of Greatest Conservation Need that are not currently considered to be at risk for which Wisconsin contains a large part of the population or continental range. Similar to lists 2 and 3 discussed directly above, these vertebrate species are not the focus of Wisconsin's Strategy for Species of Greatest Conservation Need.

The four lists of vertebrate species that resulted from this process should be viewed as dynamic. A strategy for reviewing and revising these lists has been developed and is presented in Chapter 7. The species lists will be adjusted as additional data become available or state rarity, state threats, state population trends, global relative abundance, global distributions, global threats, or global population trends of species change in response to natural or non-natural influences.